

1 CLAIMS:

2 1. A semiconductor processing method comprising:
3 forming an antireflective material layer over a substrate;
4 annealing at least a portion of the antireflective material layer at
5 a temperature of greater than about 400° C;
6 forming a layer of photoresist over the annealed antireflective
7 material layer;
8 patterning the layer of photoresist; and
9 removing a portion of the antireflective material layer unmasked
10 by the patterned layer of photoresist.

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12 2. The method of claim 1 wherein the antireflective material
13 layer comprises a stack of layers.

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15 3. The method of claim 1 wherein the antireflective material
16 layer consists of one substantially homogenous layer.

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18 4. The method of claim 1 wherein the layer of photoresist is
19 formed against the antireflective material layer.

1 5. A semiconductor processing method comprising:
2 forming an antireflective material layer over a substrate;
3 annealing the antireflective material layer at a temperature of
4 greater than about 400° C;

5 forming a layer of photoresist over the annealed antireflective
6 material layer; and

7 exposing portions of the layer of photoresist to radiation waves,
8 some of the radiation waves being attenuated by the antireflective
9 material during the exposing.

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11 6. The method of claim 5 wherein the attenuation comprises
12 absorbing radiation waves with the antireflective coating.

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14 7. The method of claim 5 wherein the layer of photoresist is
15 formed against the antireflective material layer.

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17 8. The method of claim 5 wherein the annealing temperature
18 is greater than about 800° C.

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20 9. The method of claim 5 further comprising exposing the
21 antireflective material layer to a nitrogen-containing atmosphere during
22 the annealing.

1 10. The method of claim 5 wherein the antireflective material
2 layer comprises oxygen, nitrogen and silicon.

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4 11. The method of claim 5 wherein the antireflective material
5 layer comprises from about 5% to about 37% (by atomic concentration)
6 oxygen, from about 10% to about 35% (by atomic concentration)
7 nitrogen, from about 50% to about 65% (by atomic concentration)
8 silicon, and hydrogen.

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10 12. The method of claim 5 wherein the annealing temperature
11 is from about 800° C to about 1050° C, and wherein the antireflective
12 material layer comprises from about 5% to about 37% (by atomic
13 concentration) oxygen, from about 10% to about 35% (by atomic
14 concentration) nitrogen, from about 50% to about 65% (by atomic
15 concentration) silicon, and hydrogen.

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17 13. A semiconductor processing method comprising;
18 forming a solid antireflective material layer over a substrate;
19 altering optical properties of the antireflective material layer;
20 after altering the optical properties, forming a layer of photoresist
21 over the antireflective material layer; and
22 exposing portions of the layer of photoresist to radiation waves
23 and absorbing some of the radiation waves with the antireflective
24 material.

1 14. The method of claim 13 further comprising exposing the
2 antireflective material layer to an atmosphere during the altering, the
3 atmosphere comprising at least one of nitrogen and argon.

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5 15. The method of claim 13 wherein the optical properties
6 which are altered include at least one of an "n" coefficient or a "k"
7 coefficient.

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9 16. The method of claim 13 wherein the altering comprises
10 annealing the antireflective material layer at a temperature greater than
11 about 400° C.

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13 17. The method of claim 13 wherein the altering comprises
14 annealing the antireflective material layer at a temperature greater than
15 800° C.

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17 18. The method of claim 13 wherein the altering comprises
18 annealing the antireflective material layer at a temperature of from
19 about 800° C to about 1050° C, and wherein the antireflective material
20 layer comprises from about 5% to about 37% (by atomic concentration)
21 oxygen, from about 10% to about 35% (by atomic concentration)
22 nitrogen and from about 50% to about 65% (by atomic concentration)
23 silicon.
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1 19. A semiconductor processing method comprising;
2 chemical vapor depositing an antireflective material layer onto a
3 semiconductive material substrate at a temperature of from about
4 300° C to about 400° C;

5 annealing the solid antireflective material layer at a temperature
6 of from about 800° C to about 900° C to alter at least one of an "n"
7 coefficient or a "k" coefficient of the antireflective material layer;

8 forming a layer of photoresist over the annealed antireflective
9 material layer;

10 exposing portions of the photoresist to radiation waves while
11 leaving other portions of the photoresist unexposed and absorbing some
12 of the radiation waves with the antireflective material; and

13 selectively removing either the exposed or unexposed portions of
14 the photoresist while leaving the other of the exposed and unexposed
15 portions over the substrate.

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17 20. The method of claim 19 wherein the antireflective material
18 layer comprises oxygen, nitrogen and silicon.
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21. The method of claim 19 wherein the antireflective material layer comprises from about 5% to about 37% (by atomic concentration) oxygen, from about 10% to about 35% (by atomic concentration) nitrogen, from about 50% to about 65% (by atomic concentration) silicon, and hydrogen.